Acto de Homenaje

UNIVERSIDAD
COMPLUTENSE
MADRID

en memoria del profesor

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Viernes 22 de Noviembre de 2013; 12:30h; Aula Miguel de Guzmán
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Recensiones realizadas por **Francisco José Cano Sevilla**

Author(s)	Title	MSC main category	Idioma	Fecha
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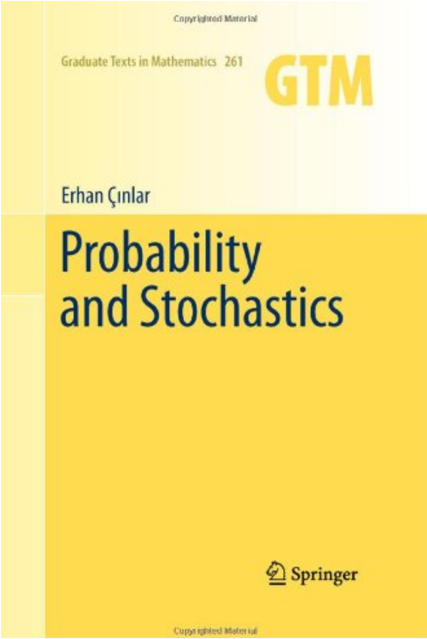
Dieter Jungnickel	**Graphs, Networks and Algorithms**	05 Combinatorics	Español	2-Julio

Recensiones matemáticas

February 27, 2013 - 13:02



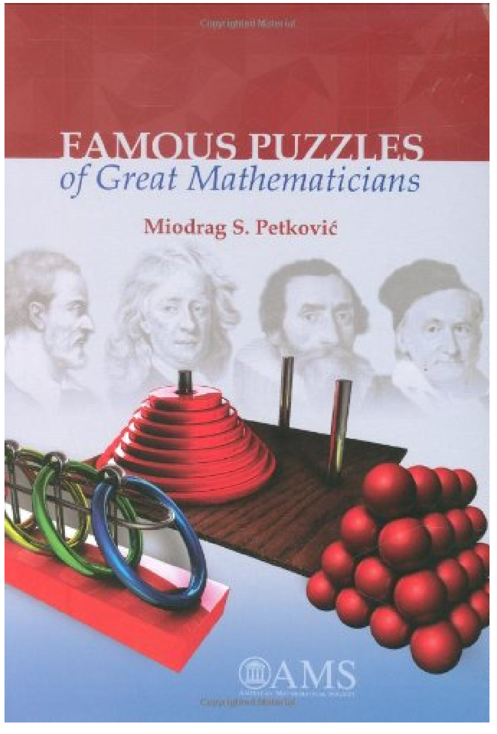
Probability and Stochastics
Erhan Çinlar

The book is an introduction to the modern theory of probability and stochastic processes. It based on the lecture-notes for two-semester, fairly popular, which Prof. Çinlar, a well-known professor and researcher, at Princeton University,ecinlar@princeton.edu, has offered for many years. The first four chapters are in probability theory: measure and integration, probability theory, convergence and conditioning. The first chapter is a review of measure and integration in the context of the modern literature on probability and stochastic processes. The second introduces probability spaces as especial measure spaces. The chapter three is on convergence, routinely classical, and the chapter four in on conditional expectations included Radon-Nikodyn derivatives. There follows chapters on martingales and stochastics, Poisson random measures, Brownian motion and Markov Processes. Martingales are introduced in chapter V, the treatment of continuous martingales contain an improvement, achieved through the introduction of a Doob martingale, a stopped martingale that is uniformly integrable. Two great theorems are considered: martingale characterization of Brownian motion due to Lévy and the characterization of Poisson process due to Watanabe. Poisson random measures are in Chapter VI, the treatment is from the point of view of their uses, specially, of Lévy processes. This chapter pays some attention to processes with jumps. The chapter VIII on Brownian motion is mostly on the standard material. Finally, the Chapter IX, on Markov processes, Itô diffusions and jump-diffusions are introduced via stochastic integral equations, as an integral path in a field of Lévy Proceses.

In short, the book is higher recommended. It provides new simple proofs of important results on Probability Theory and Stochastics Processes. In my opinion, it is a stimulating textbook will be for the teaching and research of the material. A well written text with excellent tools for many instances, in every day language, and then all written precise in mathematical form.

Recensiones matemáticas

March 1, 2013 - 09:53



This book is an interesting work on recreational problems on mathematics in the history. This entertaining book presents a collection of 180 famous mathematical puzzles and intriguing elementary problems that great mathematicians have posed, discussed, and/or solved. About 65 intriguing problems, marked by *, are given as exercises, to the readers. The selected problems do not require advanced mathematics, making this excellent book accessible to a variety of readers. The book is intended principally to amuse and entertain, incidentally to introduce the general reader to other intriguing mathematical topics and ideas. Important relations and connections exist between those problems originally meant to amuse and entertain and mathematical concepts critical to combinatorial and chess, geometrical, and arithmetical puzzles, geometry, graph theory, optimization theory, probability, number theory, and related areas. The book contains eleven chapters and four appendices. The first six chapters are on: recreational mathematics (a brief and concise history of mathematics); arithmetics; number theory; geometry; tiling and packing and physics.

The chapter one is on Recreational Mathematics contains, before taking up the noteworthy mathematical thinkers and their memorable problems, a brief overview of the history of mathematical recreations. Perhaps the oldest known example is the magic square. Known as lo-shu to Chinese mathematicians around 2200 B.C., the magic square was supposedly constructed during the reign of the Emperor Yii. Chinese myth holds that Emperor Yii saw a tortoise of divine creation swimming in the Yellow River with the lo-shu, or magic square figure, adorning its shell. The Rhind (or Ahmes) papyrus dating to around 1650 B.C., suggests that the early Egyptians based their mathematics problems in puzzle form. Perhaps their main purpose was to provide intellectual pleasure. The ancient Greeks also delighted in the creation of problems strictly for amusement. The cattle problem is one of the most famous problems in number theory, whose complete solution was not found until 1965 by a digital computer. The Dido´s problem, cited by Virgil, and the elegant solution, established by Jacob Steiner, regarded as first problem in a new mathematical discipline, established 17 centuries later, as calculus of variations. Others interesting problems are included in this book, as Josephus problem; Alcuin of York´s problems and variants; Fibonacci´s amusing problems; IbnKallikan´s problem about the number of wheat grains on a standard 8x8 chessboard; and many instances interesting.

Famous Puzzles of Great Mathematicians
Miodrag S. Petkoviç

In chapter two, named Arithmetics, are related many instances of famous puzzles: Diophantus´ age; Mahavira: number of arrows; Fibonacci´s: square numbers problem, money in a pile, sequence, how many rabbits?; triangle with integral sides (Bachet); sides of two cubes (Viète), and others puzzles.

Chapter three on Number Theory deal with the following famous: cattle problem; dividing the square; wine problem; amicable numbers, Qorra formula; how many soldiers?; horses and bulls; the sailors, the coconuts and the monkey; stamp combinations, with a generalized problem of Frobenius and Sylvester.

In chapter four, on Geometry, are related some instances: Arbelos problem of Arquimedes, archimedean circles, perpendicular distance and two touching circles; minimal distance of Heron, a fly and a drop of honey, peninsula problem; dissection of three squares; dissection of four triangles; the minimal sum of distances in a triangle; volumes of cylinders and spheres of Kepler; Dido´s problem; the shortest bisecting arc of area de Polya, and other interesting problems.

Chapter five on Tiling and Packing deal interesting and amusing problems in the history of mathematics as: mosaics; non-periodic tiling; maximum area by pentaminoes; kissing spheres; the densest sphere packing, and the cube-packing puzzles. The chapter six is related to famous problems on Physics as the gold crown of King Hiero; the length of traveled trip; meeting of ships; a girl and the bird, and the lion and the man.

There follows chapters on combinatorics; probability; graphs; chess and miscellany which contains problems from Alcuin de York, Abu´lWafa, Fibonacci, Bachet, Huygens, Newton and Euler.

The chapter seven on Combinatorics, deal the Josephus problem; rings puzzle; the problem of the misaddressed letters; eulerian squares, and the famous Kirkman´s schoolgirls problem. Others interesting problems as counting problem, the tower of Hanoi, the tree planting problem, etc., are included in this chapter.

In the chapter 8 on Probability are considered, the famous problem of the points, gambling game with dice, gambler´s ruin, Petersburg paradox, the probability problem with the misaddressed letters, and the match problem are all treated of elegant form.

The chapter nine deal on Graphs. Contains the famous problem of Königsberg´ bridges, Hamilton´game on a dodecahedron, some problems of Alcuin of York, Erdös, Poinsot, Poisson, Listing, and others problems of interest.

In the chapter ten on chess, many instances and problems are considered: classical knight, queen, rooks and the longest uncrossed knight´s tour.

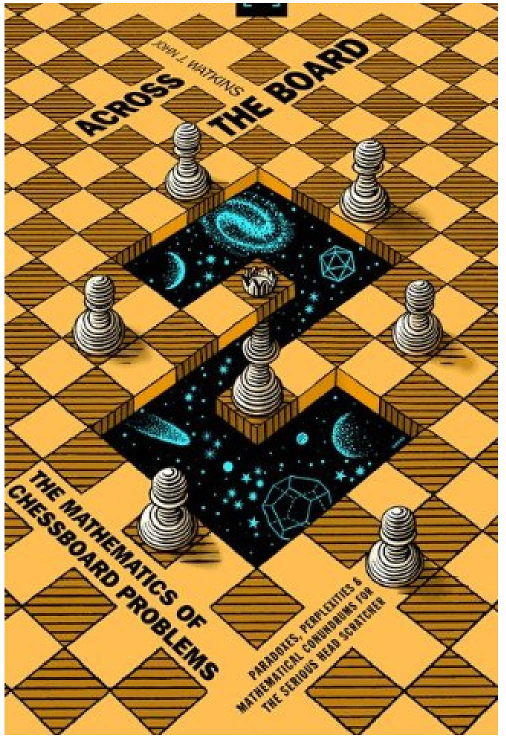
The chapter eleven, titled Miscellany, contains problems from Alcuin de York, Abu´lWafa, Fibonacci, Bachet, Huygens, Newton and Euler. Finally, the four appendices, for to help readers, on refer: method of continued fractions for solving Pell´s equation; geometrical inversion; some basic facts from graph theory; linear differences equations with constant coefficients.

The author includes bibliographical references and index, and sometimes amusing anecdotal material, with the objective that to underscore the informal and recreational character of the book.

The book is also high recommended also for individual study. In my opinion, it is a stimulating and excellent text will be for amuse and entertaining, and the teaching in recreational mathematics.

Recensiones matemáticas

April 15, 2013 - 10:03



Across the Board: The Mathematics of Chessboard Problems
John J. Watkins

This remarkable book is the first systematic work on chessboard problems and full-length book on the chessboard itself, devoted to an intriguing and comprehensive study from the knight´s tour problem and Queens Domination problems, in their many variations. Such earlier problems, including those involving other particular considerations, have now extended to three-dimensional chessboards, torus-shaped boards, a shape called Klein bottle, cylinders, etc.

The book is a stimulating and very well written. It is admirably clear. It explains not only methods and results but the motives for choosing, in each moment, various procedures. The material used in the book, is supplemented by excellently chosen exercises, questions or problems, some of which give an insight into other aspects of the proposed chapters. There is a good collection of problems and worked examples, with variations extending to boards of different sizes and shapes.

Across the board, is a concise, good, cleared, and indeed, definitive book on chessboard questions and problems. It is not simply about chess but the chessboard itself, in particular, the intriguing and challenging mathematics behind it. John Watkins, a well-known mathematician, surveys all the problems of interest in this promising area of recreational mathematics. Each main topic is treated in depth from its historical creation through to its status today.

The book is self-contained. The mathematical material is sufficiently closed, and contains up-to-date exposition of the key aspect of recreational mathematics. The book is quite accessible for undergraduate students of low courses, thus it can be used as a basic course book on recreational mathematics. This book can also be useful for professional and amateur mathematicians, because it contains the newest and the most significant scientific developments in this area.

The aim of the present book is to describe the main concepts of modern recreational mathematics together with full proofs that would be both accessible to beginners and useful for amateur and professional in chess problems. A large part of the present title is devoted to rapidly developing areas of recreational mathematics, such that, toruses, cylinders, others three-dimensional chessboards, etc.

The book contains thirteen chapters, references and an index, in 257 pp. It goes from the basics, classical and variants of the knight´s tour problems, domination in the queens problems, magic squares, etc., to the frontiers of research, because Watkins uses the visual language of graph theory, and guides perfectly the reader to the frontiers of current research, in news ideas emergent in mathematics. For the reader is suitable solving some of the many exercises. ¡Good experience for share seriously the problems! In short, the great resource to Professor Watkins´s proper tone ensures total attention from the audience to recreational mathematics.

The first chapter, untitled Introduction, (pp. 1-24), introduces the basic, definitions and notions, devoted to present the main topics in the subject. The chessboard provides the field of play for any number of games. Beginning with the Guarini´s problem, the earliest puzzle dated from 1512, in graph theory, and, then, one extension of Guarini´s problem to six knights, three white and three black, appeared in Scientific American in the December 1979 issue. We have just studied the famous problem of Knight´s Tour Problem, dates in the sixth century in India, with a long and rich history, from the beginnings to the frontiers of research. It is one of the main topics considered in this book. This chapter is a compendium, remarkable and fascinating encyclopedic treatment of basics, and the main topics in the area of recreational mathematics. The main topics considered and studied in the following chapters are: Knights Tour, it follows the Euler´s work in 1759, the impossibility of an knight´s tour on 4x4 board; Domination problems, first originated when the people began asking covering questions about chess pieces, i.e., the minimum number of pieces of a given type needed to cover or control the entire board; Independence problems, what is the maximum number of pieces that you can place on chessboard, so that no two pieces attack one another?; Coloring, this is a theme of high recurrence, because using coloring to see how find infinitely many chessboards that can´t possibly have knight´s tours!; Geometric Problems, covering problems in the board; Chessboards on other surfaces, and even covering chessboards with ominoes in all manner of sizes: polyominoes, i.e., monominoes, dominoes, trominoes, tetraminoes, pentominoes, and so on, for example, the domino puzzle (Gomory´s theorem) for covering the chessboard. Moreover, another interesting topic inside in a large number and not particularly easy to categorize is a puzzle that was popular in the eighteenth century, called Ozanam´s Problem, the study of the creation a Graeco-Latin square. This chapter contains, moreover, six interesting problems, stated and solved, that cover the different relevant questions.

Chapter 2, (pp. 25-38) is full dedicated to Knight´s Tours, from the early work to actually: de Moivre, Legendre, Euler that provide a powerful and flexible technique, known Euler strategy, similar to actual backtracking algorithm, Hamilton, and other outstanding mathematicians. In other words, when we are looking for a knight´s tour we are actually trying to find a Hamiltonian cycle in the associated graph. It is possible consider also another tours, for example the rook´s tour for proved the Gomory´s theorem; the queen tour, in particular Dudeney´s puzzle, bishop´s tour problem, and the king´s tour. This chapter contains, moreover, six interesting problems, stated and solved, that cover the different relevant questions.

In chapter 3 (pp.39-52) on consider the Knight´s Tour Problem. On prove the impossibility of such tour for a number of other chessboards. It mentioned that a 3x10 board was the smallest such board for which a knight´s tour is possible. A knight´s tour is impossible on the 4x4 chessboard, and also on any board both of whose dimensions are odd. There are no tours for the 3x4, 3x6 or 3x8 boards. In this chapter on present two proofs of the impossibility of knight´s tours for 4xn boards, one due to Pósa and another one to Golomb, the inventor of polyominoes and then the Schwenk´s theorem, that reads: “An m x n chessboard with $m \leq n$ has a knight´s tour unless one or more of the following three conditions hold: a) m and n are both odd; b)m = 1,2, or 4, or c) m= 3 and n= 4, 6, or 8”. To end the chapter, the case 3 x n, with an approach that works, as an inductive one, start with a tour of a small board and slowly but steadily build larger and larger tours from small tours. Any 3xn board has a knight´s tour for $n \geq 10$ and n even, that is, all the boards 3x10, 3x12, 3x14, 3x16, 3x18, etc., have tours. The chapter contains, moreover, five interesting problems, stated and solved, that cover the different relevant questions.

Chapter 4 does magic squares (pp. 53-63). Claudia Zaslavsky described Muhammad ibn Muhammad´s work on magic squares, dated in 1732, in her book on African mathematics, Africa Counts. He made use of the knight´s move in order to construct magic squares of odd order, squares of size 3x3, 5x5, 7x7, etc. In magic squares, the sum of the numbers in each row, each column, and each of the main diagonals, for 3x3 will be 15; for 5x5 will be 65; and, for

7x7 the sum will be 175. This very same construction was discovered by Bachet en the early 1600s and a nearly identical construction was brought, by de la Loubère. In this chapter, on considered also, semi-magic squares, studied by Euler, Jaenisch, Wenzelides, Mrignac, and others famous mathematicians; and is possible using kings (Ghersi. 1921), and rooks (Rabinoff, 1925) tours, to construct magic squares. The chapter contains, four interesting problems, stated and solved, that cover the different relevant questions.

In Chapter 5 (pp. 65-77), in the present book, will look many variations on the consideration of chessboards on two surfaces: the torus and the cylinder. On proves that on a torus: “Every rectangular chessboard has a knight´s tour”. As earlier, a knight has significantly more mobility on a torus, and so the knight´s graph for the 4x4 chessboard on a torus is highly richer that on 4x4 chessboard. On a torus each square is now completely equivalent, and so the degree of each vertex will be 4.Moreover, it turns out that the 4x4 toroidal knight´s graph is identical to an extremely famous graph called the 4-cube, or hypercube. Then we explored the relation between the 4-cube and the Gray codes, invented by Frank Gray in the 1940s, as a way to transmit strings of data so that a small error occurring during transmission will result in only a small error in the received message. Gray listed all the strings in a sequence so that adjacent strings differ in only one position. This Gray code, in fact, corresponds to a Hamiltonian cycle in the hypercube. To end the chapter, the following theorem (Watkins) solved an exact description of which rectangular chessboards have knight´s tour on cylinders: “An mxn cylindrical chessboard with m rows and n columns, the rows wrapped around the cylinder, has a knight´s tour unless one of the following two conditions hold: a) m= 1 and n>1; or b) m =2 or 4 and n is even”. This chapter considered six problems and their respective solutions.

Chapter 6, (pp.79-94), deals with the Klein bottle and other variations. The different interesting ways to identify edges, that is, to look at a rectangular chessboard, produced a new surface, called Klein bottle, for example identify the top and bottom edges of the rectangle just as we did for the torus; and also identify the left and the right edges, but in reverse order. The following theorem due to Watkins solved completely the question: “On a Klein bottle, every rectangular chessboard has a knight´s tour”. The Möbius strip is the most famous example of a one-sided surface. It is also, another way to identify edges in a rectangular chessboard, just one pair of opposite edges as we did for the cylindrical board, but this time to add a half twist just we did for the Klein bottle. Similarly, the following theorem (Watkins) solved the question: “An m x n chessboard on a Möbius strip, with m rows and n columns, the rows wrapped around the Möbius strip, has a knight´s tour unless one or more of the following three conditions hold: a) m= 1 and n>1; or n=1 and m=3, 4, or 5; b) m =2 and n is even, or m=4 and n is odd; c) n=4 and m =3”. Since about the middle of the nineteenth century mathematician have had a complete list of all possible surfaces. This list is fully described as the Classification Theorem. Surfaces such as the sphere, the torus and the Klein bottle are called closed, that they are finite, also called two-manifolds, and each of these surfaces has a number assigned to it, the Euler characteristic of the surface. Surface such as the plane is infinite or open. Other variations, such as, the Euler characteristic of the surface, Klein bottle, torus, etc.; the third dimension; boxes; camel piece, a chess piece used in Persian chess (fourteenth century); triangular honeycombs (1997); three dimensional torus, and so on, are also discussed. Moreover, this chapter considered four problems and their respective solutions.

Chapter 7, (pp.95-111), is related with the classical and interesting, well-known domination problem. The concept of domination is one of the central ideas in graph theory, and is especially important in the applications of the theory to the real world. A set S of vertices in a graph G is called a dominating set if every vertex in the graph is either in the set S or is adjacent to a vertex in the set S. The domination number if a graph is, then, the minimum size of a dominating set in the graph. In this chapter on analyzed the covering problem. This problem is defined as follows: for each chess piece: how many chess pieces of an individual type are required to cover an nxn chessboard? It is among the oldest and most studied problems related to the chessboard, and it and its many variations, for example: knights, rooks, bishops, and kings. The chapter contains, moreover, five interesting problems, stated and solved, that cover the different relevant questions.

The chapter 8, (pp.113-137), is devoted to the intriguing and challenging queens domination problem and other variants. The chapter presents the Spencer-Cockatyne construction, upper and lower bound for the number of queens needed to cover an nxn board, Spencer´s remarkable lower bound, Weakley´s new improved lower bound, etc. The chapter contains, moreover, three interesting problems, stated and solved, that cover the different relevant questions.

The Chapter 9, (pp. 139-162), is related with domination on other surfaces. In this chapter on take another look at the domination problem for each of the chess pieces and consider what happens on the torus and the Klein bottle for the queen, the knight, the rook, the bishop, and the king. More general result about pieces dominating rectangular toroidal chessboards and on a Klein bottle on presented. The chapter contains, moreover, seven interesting problems, stated and solved.

In the chapter 10, (pp. 163-189), devoted to the independence problem, on analyzed the concept of independence, closely related to that of domination. The concept of independence is also one of the central ideas in graph theory, and is especially important in the applications of the theory to the real world. Two vertices in a graph are independent if there is no edge joining them. A set of vertices in a graph G is said to be an independent set if no two vertices in S are adjacent. The independence number of a graph G is the cardinal of the maximum independence set. An independent set with this maximum size is called a maximum independent set. The 8-queens problem with all solutions; the n-queens problem, and the Ahrens theorem with the proof given by Yaglom and Yaglom, and Pólya´s doubly periodic solutions; independent rooks; independent knights; independent bishops, and independent kings, on presented. The chapter contains, moreover, seven interesting problems, stated and solved.

The chapter 11, (pp. 191-212), is related to other surfaces and other variations. In this chapter on treated the independence number for each of the chess pieces on a variety of other surfaces, such as the torus and the Klein bottle. It is interesting the following statements: the 8-queens problem on a cylinder; independent kings on a torus; independent kings on a Klein bottle; combinations of two notions of domination and independence: the covering problem; the upper domination number; the irredundance numbers, and the total domination number. The chapter is illustrated with five problems, stated and solved.

In the chapter 12, (pp. 211-222), is devoted to the study of Latin squares, a classical problem. A Latin square is an nxn array of the integers 0, 1, 2, ... , n-1, or equivalently, a labeling of the squares of an nxn chessboard with these integers, such that each integer appears once and only once in each row, and once and only once in each column. The constructing Latin squares using the Ball´s method; Eulerian squares, that is, two Latin squares of the same size such that the resulting combination by combining their entries and forming ordered pairs, is such that each the possible n2 ordered pairs occurs exactly once, then the two Latin squares are said to be orthogonal, and the new combined square is called an Eulerian square, or sometimes Graeco-Latin square, because Latin letters might be used for one square and Greek letters for the other; Euler´s conjecture impossibility to construct a pair of orthogonal Latin squares, accordingly with the dimensions of boards, in particular 6x6, is wrong. Beyond n=6, that is, n= 10,14,18,22, and so on, there always exists a pair of orthogonal nxn Latin squares for any n. The chapter is illustrated with three problems, stated and solved.

Finally, chapter 13, (pp. 223-246) is related with two problems concerning geometric dissection problems in recreational mathematics. The first problem is referred to divide the land into four identical pieces with restrictions, and the second problem is to reconstruct the entire chessboard, breaking into eight pieces. Then analyzed dominoes; dissecting rectangles into dominoes (the bricklayer´s problem); the De Bruijn´s theorem; trominoes; polyominoes; pentominoes; the remarkable three scaling problems involving pentominoes; hexominoes and beyond; the amazing figure of the final chessboard 51x58, that was covered with the 369 octominoes, that 6 of those have holes in the middle. The chapter is illustrated with seven problems, stated and solved.

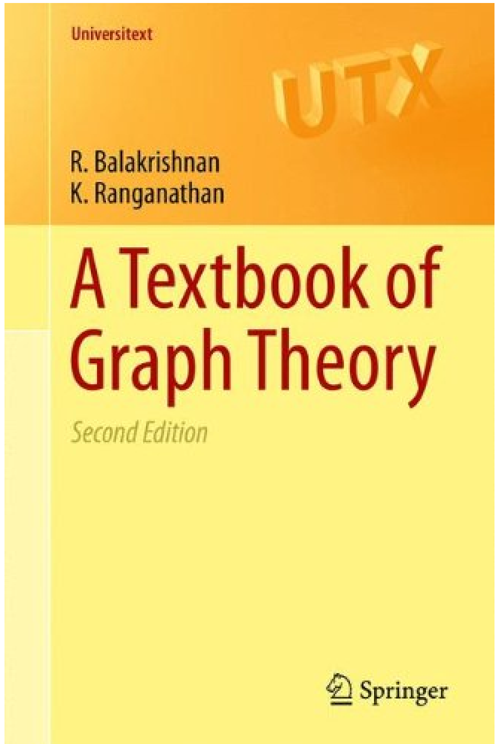
References, (pp. 247-249).
They are 41 references.
Index (pp. 251-257)

Definitely the book is high recommended and is of much interest. This book is, no doubt, the newly best exposition of the interconnection between amusing recreational mathematics and the interesting chessboard problems.

I feel sure that it will be of great use both to students of graph theory, geometry, topology and mathematics, in general, and captivate to scholars, instructors, chess enthusiasts, puzzle devotees, and to those intervening in amusing and recreational mathematics. Finally, in short, the great resource to Professor Watkins´s proper tone ensures total attention from the audience to amusing and recreational mathematics, into the adventure proposed, by this challenging and remarkable book.

Recensiones matemáticas

April 29, 2013 - 08:44



A textbook of Graph Theory
R. Balakrishnan and K. Ranganathan

Graph theory has witnessed an unprecedented growth in the 20th century. The best indicator for this growth is the explosion in MSC2010, field 05: Combinatorics. One of the main reasons for this phenomenon is the applicability of graph theory in other disciplines such as physics, chemistry, psychology, sociology, and theoretical computer science.

This Second Edition is a revised and enlarged edition with two new chapters—one on domination in graphs (Chap. 10) and another on spectral properties of graphs (Chap. 11)—and an enlarged chapter on graph coloring (Chap. 7). Chapter 10 presents the basic properties of the domination number of a graph and also deals with Vizing's conjecture on the domination number of the Cartesian product of two graphs. Chapter 11 contains several results on the eigenvalues of graphs and includes a section on the Ramanujan graphs, and another on the energy of graphs. The new additions in Chap. 7 include the introduction of b-coloring in graphs and an extension of the discussion of the Myceilskian of a graph over what was given in the First Edition. The sections of Chap. 10 of the First Edition that contained some applications of graph theory have been shifted in the Second Edition to the relevant chapters: "The Connector Problems" to Chap. 4, "The Timetable Problem" to Chap. 5 and the "Application to Social Psychology" to Chap. 1.

The book goes from the basics to the frontiers of research in graph theory, with newly ideas emergent, in mathematics or computer science. For the reader is suitable solving some of the many exercises proposed.
I feel sure that it will be of great use both to students of graph theory and mathematics, or computer science, and provide a solid background in the basic topics of graph theory, and is intended both for a graduate or advanced undergraduate in mathematics, or computer science as reference for the researcher.

The book can also be adapted for an undergraduate course in graph theory by selecting some sections: 1.1–1.6, 2.1-2.3, 3.1-3.4, 4.1-4.5, 5.1-5.4, 5.5 (omitting consequences of Hall's theorem), 5.5 (omitting the Tutte matrix), 6.1-6.3, 7.1, 7.2, 7.5 (omitting Vizing's theorem), 7.8, 8.1-8.4, and Chap. 10.

The authors are well-known: R. Balakrishnan, Department of Mathematics, Bharathidasan University, Sir C.V. Raman Road, Tiruchirappalli, 620 024, Tamil Nadu, India, and K. Ranganathan, (Deceased, in 2002). The Professor Balakrishnan welcomes any comments, suggestions, and corrections from readers. They can be sent to his at the email address: mathbala@sify.com.An ambitious teacher can cover the entire book in a one-year (equivalent to two semesters) master's course in graph theory, or mathematics, or computer science. However, a teacher who wants to proceed at leisurely pace can omit the sections that are starred. Exercises that are starred are non-routine.

The book contains preface to both editions, list of figures (p. i-xii), eleven chapters: 1 Basic Results.- 2 Directed Graphs.- 3 Connectivity.- 4 Trees.- 5 Independent Sets and Matchings.- 6 Eulerian and Hamiltonian Graphs.- 7 Graph Colorings.- 8 Planarity.- 9 Triangulated Graphs.- 10 Domination in Graphs.- 11 Spectral Properties of Graphs.- Bibliography.- Index, in 292 pages.

The first chapter, Basic Results, (p. 1-35), on consider graphs that serve as mathematical models to analyze many concrete real-world problems successfully. Certain problems in physics, chemistry, communication science, computer technology, genetics, psychology, sociology, and linguistics can be formulated as problems in graph theory. Also, many branches of mathematics, such as group theory, matrix theory, probability, and topology, have close connections with graph theory. In this chapter, on study the basics of theory of graphs, for example, a little introduction with the mention of the main topics historical problems: the famous Königsberg bridge problem; the challenging hamiltonian graph; the theory of acyclic graph; the study of trees; the well-known four-color problem; planar graphs; problems of linear programming and operations research; the Kirkman´s school girl problem and scheduling problems, and many more such problems can be added to the list. Then basic concepts; subgraphs; degrees of vertices, with the famous Euler´s theorem and their corollaries; paths and connectedness; automorphism of a simple graph; line graphs, Whitney´s theorem (1932); operations on graphs; graph products; an application to chemistry; application to Social Psychology; miscellaneous exercises, with 21 proposed exercises, and notes, a good account of references. In each above item there are quite easy simple, exercises, and examples, for the reader.

In the chapter two, Directed Graphs, (p. 37-47), these arise in a natural way in many applications of graph theory. The street map of a city, an abstract representation of computer programs and network flows can be represented only by directed graphs rather than by graphs, and are also used in the study of sequential machines and system analysis in control theory. The chapter is dedicated to basic concepts; tournaments, with Rédei (1934) and Moon (1968) theorems; k-partite tournaments; included five proposed exercises, and a brief notes about related references.

In the chapter 3, Connectivity, (p. 49-71), on analyzed it as a “measure” of its connectedness. Some connected graphs are connected rather “loosely” in the sense that the deletion of a vertex or an edge from the graph destroys the connectedness of the graph. There are graphs at the other extreme as well, such as the complete graphs Kn, $n \ge 2$, which remain connected after the removal of any k vertices, $1 \le k \le n - 1$.The chapter is totally devoted to connectedness, first, questions related to vertex cuts and edges cuts, then connectivity and edge connectivity, with outstanding Whitney´s theorem (1932); blocks; cyclical edge connectivity of a graph; the great Menger´s theorem (1927), more general that Whitney´s theorem, with applications to the theory of flows, the celebrated max-flow min-cut theorem due to Ford and Fulkerson (1956), and Dirac´s theorem (1960), on k-connected graphs. The chapter included fourteen proposed exercises, and notes with the associated bibliography, i.e., that chronologically, Menger´s theorem appeared, in the literature, the first, followed Whitney´s generalizations of Menger´s theorem.

The chapter 4, Trees, (p. 73-95), these form an important class of graphs. Of late, their importance has grown considerably in view of their wide applicability in theoretical computer science. In this chapter completely devoted to the basic structural properties of trees, their characterization and simple properties; their centers and centroids, Jordan´s theorem (1869); counting the number of spanning trees, on presented interesting consequences, expressed in form of corollaries, of the Tutte (1961)-Nash-Williams (1961) theorem on the existence of k pairwise edge-disjoint spanning trees in a simple connected graph. If k=2, obtained the result of Kundu (1974), about the bounds on the number of disjoint spanning trees; also, on presented Cayley´s formula (1857) for the number of spanning trees in the labeled complete graphs Kn; Helly property in the sense that any family of sub-trees of a tree satisfies the property; then some immediate applications of trees, in everyday life problems, as the connector problem, the Kruskal´s algorithm (1956) and Prim´s algorithm (1957), which determine a minimum-weight spanning tree in a connected weighted graph, and discussed the shortest path problems and Dijkstra´s algorithm (1959), which determines a minimum-weight shortest path between two specified vertices of a connected weighted graph. To end, the chapter included sixteen proposed exercises, and notes with historical references to intriguing problems on trees.

The chapter 5, Independent Sets and Matchings, (p. 97-115), deals vertex-independent sets and vertex coverings as also edge-independent sets and edge coverings of graphs occur very naturally in many practical situations, and hence have several potential applications. In this chapter, on study the properties of these sets. In addition, on discuss matchings in graphs and, in particular, in bipartite graphs. Matchings in bipartite graphs have varied applications in operations research. Moreover, two celebrated theorems of graph theory, namely, Tutte's 1-factor theorem and famous Hall's matching theorem. All graphs considered in this chapter are loopless. In this chapter look deals vertex-independent sets and vertex coverings, the definition of the independence number or the stability number, and the covering number; matchings and factors, with applications in crystal physics, and in crystallography, interested in obtaining an analytical expression for certain surfaces properties of crystals consisting of diatomic molecules; matchings in bipartite graphs, the König´s theorem, the matrix version of König theorem, the Hall´s theorem (1935) on the existence of an system of distinct representatives, the Tutte´1-factor theorem (1947), and three corollaries, one due to Petersen (1981) about that every connected 3-regular graph no cut edges has a 1-factor, and the corollary two due Cunningham that, the edge set of a simple 2-edge-connected cubic graph can be partitioned into paths of length 3, and finally, the corollary three, that a (p-1) regular connected simple graph on 2p vertices has a 1-factor, then the Sumner (1974) theorem that shows that there is another special family of graphs for which can conclude that all graphs of the family have a 1-factor, i.e., let a connected graph of even order, if is claw-free (i. e., contains no $K_{1,3}$ as an induced sub-graph), then the graph has a 1-factor. To the end the chapter, on analyzed perfect matchings and the Tutte matrix, and a bibliographical note.

In the chapter 6, Eulerian and Hamiltonian Graphs, (p. 117-142), on deals with Eulerian graphs that was initiated in the 18th century, and that of Hamiltonian graphs in the 19th century. These graphs possess rich structures; hence, their study is a very fertile field of research for graph theorists. In this chapter, on present several structure theorems for these graphs. The chapter considered Eulerian graphs, which admit, among others, two elegant characterizations, the first one is that, for a nontrivial connected graph, the following statements are equivalent: 1) G is Eulerian; 2) The degree of each vertex is an even positive integer, and 3) G is an edge-disjoint union of cycles, and the second one is Toida (1973) -McKee's, (1984), characterization of Eulerian graphs: a graph is Eulerian if and only if each edge e of G belongs to an odd number of cycles of G and, the third is the result of Bondy and Halberstan (1986), a graph is Eulerian if and only if it has an odd number of cycle decompositions; Hamiltonian graphs, and the icosian game, introduced in 1859, no decent characterization of Hamiltonian graphs is known as yet. In fact it is one of the most difficult unsolved problems in graph theory. Many sufficient conditions are known, however, none of them happens to be a necessary condition. It is interesting note that if G is Hamiltonian, then every nonempty proper subset S of V, that is, $w(G\text{-}S) \leq card(S)$, being $w(G\text{-}S)$, the number of components of the graph G-S, and the Ore´s theorem (1960) is a basic result which gives a sufficient condition for a graph to be Hamiltonian. The Dirac´s result (1952) is also very interesting. Other intriguing result for Hamiltonian graphs is due to Chvátal and Erdös (1972), if, for a simple 2-connected graph G, $\alpha \leq \kappa$, then G is Hamiltonian. (α is the independence number of G and κ is the connectivity of G); pancyclic graphs, a graph of order n (≥ 3) is pancyclic if G contains cycles of all lengths from 3 to n. G is called vertex-pancyclic if each vertex v of G belongs to a cycle of every length l, $3 \leq l \leq n$. The study of these was initiated by Bondy (1971), who showed that Ore´s condition actually implies much more. Note that if $\delta \geq n2/2$, then $m \geq n2/4$; Hamilton cycles in Line Graphs, on study the existence of Hamilton cycles in line graph, Harary and Nash-William's theorem (1965) on the hamiltonicity of line graphs, and others interesting theorems and corollaries; 2-Factorable Graphs, it is clear that if a graph is r-factorable with k, r-factors, then the degree of each vertex is rk. In concrete, if G is 2-factorable, then is regular of even degree, say 2k. The converse is also true, is a result due a Petersen (1891). To end, the chapter included eighteen proposed exercises, and notes with historical references to the nice survey of Hamiltonian problems given by Lesniak (1991), and others references of interest.

In the chapter 7, related to the study Graph Colorings, (p. 143-174). This is very important because the graph theory would not be what it is, today, if there had been no coloring problems. In fact, a major portion of the 20th-century research in graph theory has its origin in the four-color problem. This chapter presents the basic results concerning vertex and edge colorings of graphs. In this second edition, is an enlarged chapter on graph coloring, the new additions include the introduction of b-coloring in graphs and an detailed extension of the description of the Myceilskian of a graph over what was given in the first edition. In particular, contains the following aspects: applications of graph coloring to the storage problem about incompatible chemicals, and to the examination schedule; critical graphs with the great Brooks´s theorem (1941), other coloring parameters, and the important concept of b-colorings, introduced by Irving and Manlove (1999), i.e., a proper coloring with the additional property that each color class contains a color dominating vertex, that is, a vertex that has a neighbor in all the other color classes; homomorphisms and colorings, quotient graphs; triangle-free graphs, a graph is triangle-free if the graph contains no K3. The construction of triangle-free k-chromatic graphs, k ≥ 3, was raised and answered by Mycielski (1955), who developed an interesting graph transformation known as the Mycielskian of a graph; edge colorings graphs, with an application, the timetable problem, draw up a timetable for the day that requires only minimum number of periods, that r teachers to teach in s classes, König´s theorem, and other important theorem on graph coloring, the Vizing (1964)-Gupta (1966) theorem, one of the major result in edge coloring of graphs; a brief discussion of snarks (unusual creature, described by Martin Gardner, in Lewis Caroll´s poem, the Hunting of the snark), as a consequence of the Vizing-Gupta´s theorem. A snark is a cyclically 4-edge-connected cubic graph of girth at least 5 that has chromatic index 4. The Petersen graph is the smallest snark and it is the unique snark on 10 vertices. The construction of snarks is not easy. In 1975, Isaacs constructed two infinite classes of snarks. Prior to that, only four kinds of snarks were known: the Petersen graph, Blanusă´s graphs on 18 vertices, Szekeres´s graph on 50 vertices, and the Blanche-Descartes´s graph on 210 vertices; then the celebrated Kirkman´s schoolgirl problem (1850), and finally chromatic polynomials. A brief bibliographical note closed the chapter.

The chapter 8, Planarity, (p. 175-205), deals with the study of planar and nonplanar graphs, and the several attempts to solve the four-color conjecture that have contributed a great deal to the growth of graph theory. Actually, these efforts have been instrumental to the development of algebraic, topological, and computational techniques in graph theory. This chapter deals the basic results on planar graphs, and also two important characterizations theorems for planar graphs, Wagner´s theorem (1937), (same as the Harary-Tutte theorem (1965), and as a consequence, Kuratowski´s theorem (1930), whose proofs, in this book, following to Fournier (1980). Also the classical Euler Formula and its consequences; the fact that K5 and K3,3 are nonplanar graphs; the dual of a plane graph; the four-color theorem and the Heawood five-color theorem, after the conjecture first published in 1852, the solution found, Appel, Haken and Koch (1977), established the validity of the conjecture in 1976 with the aid of computer, 1200 hours of computer time on a high speed computer; Hamiltonian plane graphs; the Tait coloring (1880), unfortunately, Tait´s proof of the four color theorem was based in wrong assumption that any 2-edge-connected cubic planar graph is Hamiltonian, the counterexample is due a Tutte (1946), 65 years later, because the Tutte graph is not Hamiltonian, and a brief note ends the chapter.

The chapter 9, Triangulated Graphs, (p. 207-220), these form an important class of graphs. They are a subclass of the class of perfect graphs and contain the class of interval graphs. They possess a wide range of applications, for example, in phasing the traffic lights at a road junction. Behind the definition of perfect graphs, on introduce the triangulated and interval graphs. Then continue bipartite graph of a graph; circular arc graphs; twenty two proposed exercises, and the application to phasing the traffic lights. Notes about Berge´s graphs, and the strong perfect graph Berge´s conjecture (1960), ends the chapter.

In the chapter 10, Domination in Graphs, (p. 221-239), it is a new chapter in this second edition. It is an area of graph theory that has received a lot of attention in recent years. It is reasonable to believe that domination in graphs has its origin in chessboard domination. The pieces domination had positive answers, for example, in queens problem, the number of domination of queens in the standard chessboard is 5.The chapter analyzed the following questions: bounds for the domination number; bounds for the size m in terms of order n and domination number, the basic result of Vizing (1965); independent domination and irredundance; thirteen proposed exercises; the extensive Vizing´s conjecture, with delicious lemmas and theorems; the interesting Barcalkin-German´s theorem (1979) for decomposable graphs in the sense that G is decomposable, then G satisfies Vizing´s conjecture; domination in direct graphs, and notes.

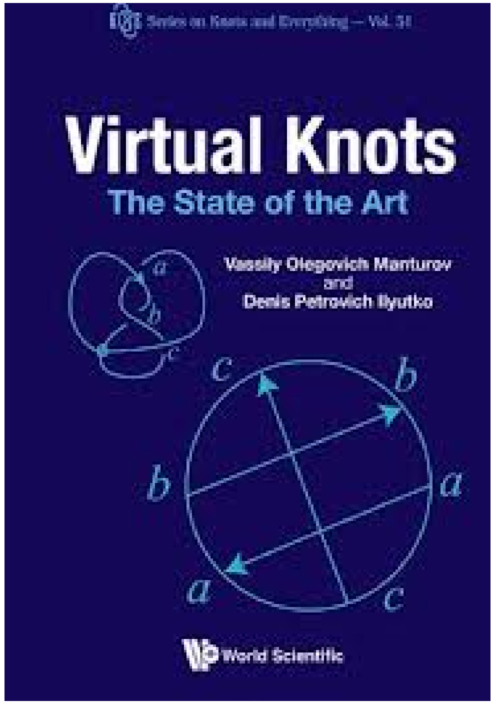
In the chapter 11, Spectral Properties of Graphs, (p. 241-273), look at the properties of graphs from our knowledge of their eigenvalues. The set of eigenvalues of a graph G is known as the spectrum of G and denoted by Sp (G). All graphs considered in this chapter are finite, undirected, and simple. The spectra of some well-known families of graphs—the family of complete graphs, the family of cycles etc., are calculated. Then present Sach's theorem (1967), on the spectrum of the line graph of a regular graph, and also obtain the spectra of product graphs—Cartesian product, direct product, and strong product. On introduce Cayley graphs and Ramanujan graphs and highlight their importance. Finally, it analyzed an application of graph spectra to chemistry, the "energy of a graph"—a graph invariant that is widely studied these days. The chapter deals with details the spectrum of a graph, and the characteristic polynomial; the spectrum of different graphs, as the complete graph, the cycle, regular graphs, the complement of a regular graph, line graphs of regular graphs (Sach´s theorem (1967)), the complete bipartite graph, and the product graphs; the Cayley graphs and their spectra; Ramanujan Graphs and their spectra; and to finish the newly energy of a graph, a concept borrowed from chemistry, molecular graph, maximum energy of k regular graphs, hyperenergetic graphs, Cayley graphs, the Mycielskian of a regular graph, and an application of the Balakrishnan-Kavaskar-So´s theorem (2012) about the energy of the Mycielskian of a k-regular G in terms of the energy of G. To ends the chapter and the book, on present twenty five proposed exercises, and a brief historical note.

List of Symbols (p.275-278)
Bibliography (p. 279-285). They are an extensive bibliography, 195 up-date references.
Index, (p. 287-292)

Definitely the book is high recommended and is of much interest. It provides a solid background in the basic topics of graph theory, and is an excellent guide for graduate. I feel sure that it will be of great use to students, teachers and researchers.

Recensiones matemáticas 8

8 de Abril de 2013 a las 18:45 h



Virtual knots. The State of the Art
Vassily Olegovich Manturov y Denis Petrovich Ilyutko

La octava entrega de **Resúmenes de recensiones** nos la hace **Francisco José Cano Sevilla**, profesor del Departamento de Estadística e investigación operativa, sobre el libro *Virtual knots. The State of the Art*, de **Vassily Olegovich Manturov** and **Denis Petrovich Ilyutko.** Se trata de resúmenes de recensiones realizadas por docentes de esta Facultad para la European Mathematical Society, y del cual tenemos algún ejemplar en nuestra Biblioteca.

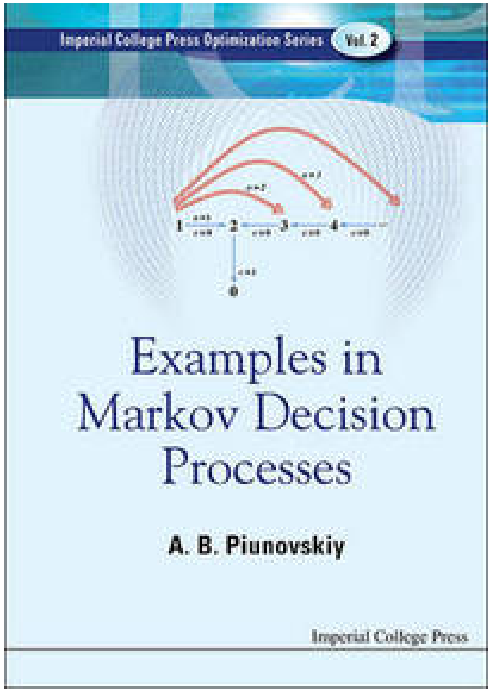
Resumen:

Es el primer libro sistemático, y de longitud completa, sobre la Teoría virtual de Nudos y Eslabones, dedicado a un fascinante y comprensivo estudio de nudos virtuales y clásicos, como parte íntegra. El texto es auto-suficiente en su contenido. El material matemático está suficientemente cubierto y cerrado, y contiene una exposición actualizada de los aspectos claves en la Teoría de Nudos virtual (y clásica). Es completamente accesible a estudiantes no graduados de cursos elementales, por consiguiente puede también usarse como un texto básico sobre el tema. Es útil también para matemáticos profesionales y amateurs, debido a que contiene los desarrollos más novedosos y significativos en la Teoría de Nudos.(...) Una gran parte del presente libro se dedica a las áreas de un vertiginoso desarrollo en la Teoría moderna de Nudos; tales como la Teoría de Nudos virtuales y la Teoría de Nudos de Legendre.

Resumen de **Francisco José Cano Sevilla**

Recensiones matemáticas 9

22 de Abril de 2013 a las 10:57 h



Examples in Markov Decision Processes
A.B. Piunovskiy

La novena entrega de **Resúmenes de recensiones** nos la hace de nuevo **Francisco José Cano Sevilla**, profesor del Departamento de Estadística e Investigación Operativa de la UCM, sobre el libro *Examples in Markov Decision Processes*, de **A.B. Piunovskiy.** Se trata de resúmenes de recensiones realizadas por docentes de la Facultad para la **European Mathematical Society**, y de las cuales tenemos algún ejemplar en nuestra Biblioteca.

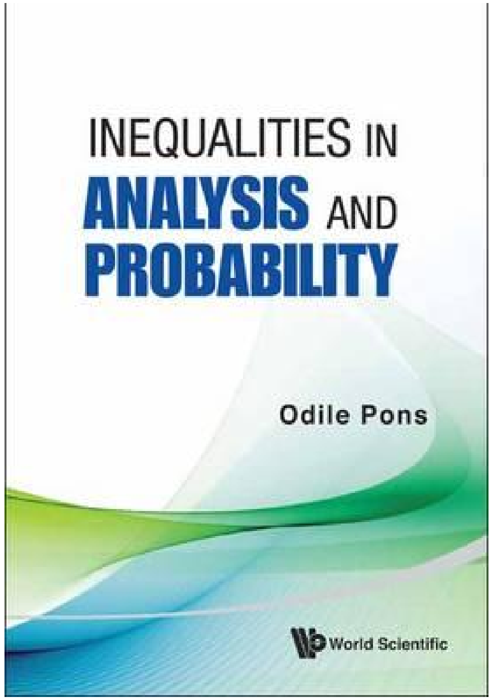
Resumen:

Excelente libro que contiene aproximadamente 100 ejemplos, que ilustran la teoría de los procesos de Markov, de tiempo discreto, controlados. La atención principal se presta a las propiedades inesperadas para el intuitivo contaje de los procesos de optimización. Tales ejemplos ilustran las condiciones impuestas a los teoremas conocidos sobre procesos de decisión markovianos. La pretensión era coleccionarlos juntos en un texto de referencia que pudiese ser considerado como un complemento a las monografías existentes sobre procesos de decisión markovianos. El libro es auto-contenido y unificado en la presentación.

Resumen de **Francisco José Cano Sevilla**

Recensiones matemáticas 11

23 de Mayo de 2013 a las 13:38 h



Inequalities in Analysis and Probability,
Odile Pons

La undécima entrega de **Resúmenes de recensiones** nos la hace **Francisco José Cano Sevilla**, profesor del Departamento de Estadística e Investigación Operativa de la UCM, sobre el libro *Inequalities in Analysis and Probability*, de **Odile Pons.** Se trata de resúmenes de recensiones realizadas por docentes de esta Facultad para la European Mathematical Society, y de las cuales tenemos algún ejemplar en nuestra Biblioteca.

Resumen:

El libro está organizado de acuerdo con los principales conceptos y tópicos en esta área y proporciona nuevas desigualdades para sumas de variables aleatorias, sus máximos, martingalas, movimientos brownianos, procesos de difusión, procesos puntuales y sus máximos.

El énfasis de las desigualdades se dirige a los estudiantes graduados y a los investigadores que tienen un conocimiento básico en Análisis, Teoría de la Integración y Probabilidad. El libro da una revisión global de las desigualdades clásicas en varios campos con las ideas principales de sus demostraciones, así como una gran cantidad de desigualdades en espacios funcionales y vectoriales con aplicaciones a la probabilidad y a completar y extender las mismas. Las desigualdades presentadas no constituyen una lista exhaustiva de ellas.

Contiene muchas demostraciones acerca de las desigualdades de martingalas con parámetros discretos o continuos, y las demostraciones de los nuevos resultados se detallan, accesibles a los lectores, y finalmente se presentan con gran detalle. Todas se ilustran con aplicaciones en teoría de la probabilidad. Su campo de estudio incluye desigualdades en espacios vectoriales y espacios funcionales de Hilbert, con el fin de simplificar la aproximación de cotas uniformes para los procesos estocásticos en clases funcionales. También desarrolla nuevas extensiones de las desigualdades analíticas, con cotas ajustadas y generalización a la suma sobre el máximo de variables aleatorias, a martingalas, y a los movimientos brownianos transformados.

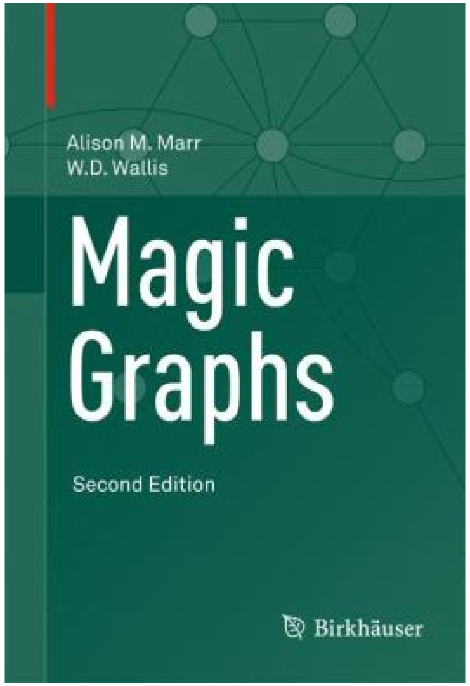
Es una atractiva introducción y extensión a las aplicaciones de las desigualdades analíticas a la probabilidad, a variables aleatorias, martingalas, procesos estocásticos con valores en espacios de Banach, espacios complejos, comportamiento de la cola de los procesos, y así sucesivamente.

El libro ayuda a dar a los lectores, a los estudiantes graduados y a los investigadores, principiantes y avanzados, un conocimiento fundamental y un compendio en probabilidad, procesos estocásticos, martingalas, movimientos brownianos, con aplicaciones muy diversas.

Resumen de **Francisco José Cano Sevilla**

Recensiones matemáticas 12

4 de Junio de 2013 a las 11:07 h



Magic Graphs, **Alison M. Marr y W. D. Wallis**

La duodécima entrega de **Resúmenes de recensiones** nos la hace **Francisco José Cano Sevilla**, profesor del Departamento de Estadística e Investigación Operativa de la UCM, sobre el libro **Magic graphs**, de **Alison M. Marr y W. D. Wallis.** Se trata de resúmenes de recensiones realizadas por docentes de esta Facultad para la European Mathematical Society, y de las cuales tenemos algún ejemplar en nuestra Biblioteca.

Resumen

El libro comienza con una visión global de los tópicos principales. Las propiedades mágicas se introducen mediante una discusión de los cuadrados mágicos, también con los cuadrados y rectángulos latinos, y lo básico de la teoría de Grafos. Este texto conciso y auto-contenido es el único libro de su tipo en el área de los grafos y etiquetados mágicos, contiene numerosos ejercicios, y sus soluciones, e incluye actualizaciones en la investigación novedosa en el área. Un etiquetado es una transformación cuyo dominio es algún conjunto de los elementos del grafo, el conjunto de vértices, por ejemplo, o el conjunto de todos los vértices y aristas, y cuyo rango es el conjunto de los enteros positivos. Varias restricciones pueden aplicarse, en la práctica, a la transformación. Recientemente ha habido un resurgimiento de interés en el etiquetado mágico debido al gran número de resultados con aplicaciones al problema de la descomposición de los grafos en árboles.

En esta segunda edición se incluye: un nuevo capítulo de etiquetado mágico de grafos dirigidos, aplicaciones de teoremas de la teoría de grafos e interesantes argumentos de conteo, esto es el por qué de una nueva segunda edición apropiada, una buena colección de problemas de investigación novedosos y ejercicios cubren un recorrido de dificultades, y una completa bibliografía actualizada y un índice. El libro es una brillante colección de resultados recientes sobre el tópico del etiquetado mágico.

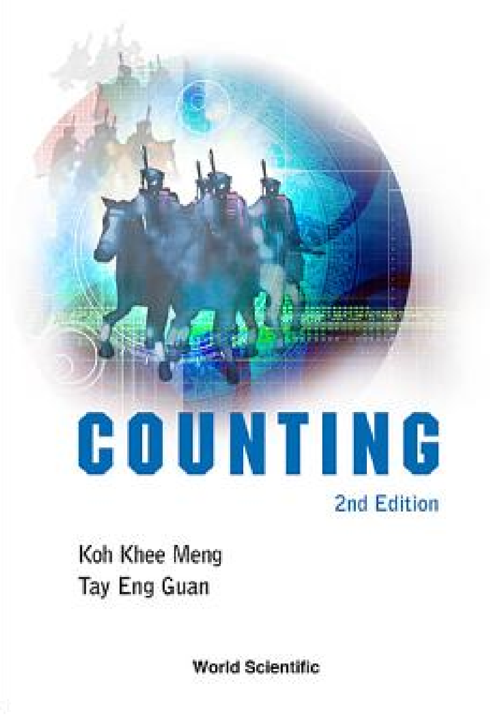
En el capítulo preliminar se supone algún conocimiento en grupos y cuerpos, también en la discusión de cuadrados mágicos y cuadrados latinos, y en lo básico de la teoría de grafos. Los capítulos siguientes exploran los tres principales tipos de etiquetado mágico, mágico de aristas, mágico de vértices, y totalmente mágico, a su vez. Por último también se discute el etiquetado mágico de grafos dirigidos.

Este libro es una excelente guía para los estudiantes graduados que comienzan la investigación en el etiquetado de grafos. Pueden ver como la nueva matemática viene a su existencia. Puede servir como un texto de graduados o no graduados avanzados en cursos de matemáticas o ciencias de la computación, y como referencia al investigador.

Resumen de **Francisco José Cano Sevilla**

Recensiones matemáticas 13

17 de Junio de 2013 a las 10:41 h



La decimotercera entrega de **Resúmenes de recensiones** nos la hace de nuevo **Francisco José Cano Sevilla**, profesor del Departamento de Estadística e investigación Operativa de la UCM, sobre el libro **Counting**, de **K.M. Koh y Eng Guan Tay.** Se trata de resúmenes de recensiones realizadas por docentes de esta Facultad para la **European Mathematical Society**, y de las cuales tenemos algún ejemplar en nuestra Biblioteca.

Resumen

Comienza con lo básico del análisis combinatorio y los tópicos. Como una rama de las matemáticas que es trata con problemas estructurados en el campo discreto. Su ámbito de estudio incluye las selecciones y ordenaciones de objetos con condiciones establecidas, configuraciones, y diseños de esquemas experimentales según determinadas reglas. En breve, el problema del conteo es uno de los problemas básicos en combinatoria, con aplicaciones en varias ramas de las matemáticas y otras disciplinas como ingeniería, ciencias de la computación, investigación operativa y ciencias de la vida.

El estudio es conciso, interesante, auto contenido, útil, claro, una introducción atractiva a lo básico en conteo, habilidades creativas y técnicas en la resolución general de problemas. Contiene numerosos ejercicios, y sus soluciones, e incluye actualizaciones de nuevas herramientas en combinatoria.

En esta segunda edición se han añadido nuevos capítulos como: Principio de Inclusión y Exclusión, Principio del Palomar, Relaciones de Recurrencia, Números de Stirling de primer y segundo tipo, y Números de Catalan, con interesantes argumentos de conteo, ésta es la razón del por qué una nueva edición parece apropiada. Una buena colección de ejemplos y ejercicios, han sido también añadidos para cubrir un espacio de dificultades, y una bibliografía recomendada para posterior lectura, respuestas a los ejercicios, y un índice. El libro es una colección sistemática maravillosa de ejemplos y ejercicios resueltos, relacionados con 20 capítulos diferentes sobre lo básico de la teoría combinatoria.

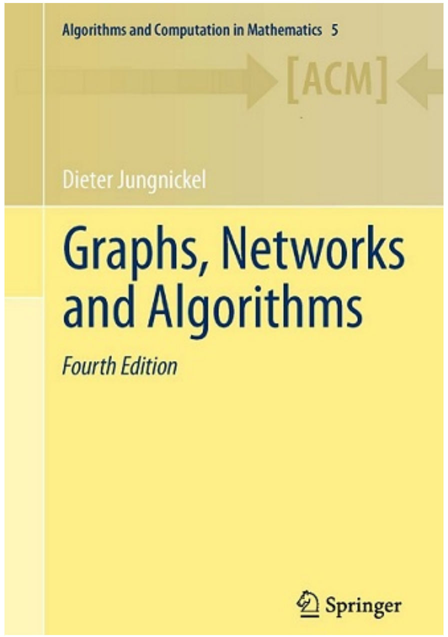
Counting, **Koh Khee Meng yTay Eng Guan**

El libro ayuda a dar a los lectores, a todas las personas que aprecian las matemáticas, a los sagaces que resuelven puzles, a los estudiantes no graduados así como a los profesores, un comienzo prematuro en el problema del aprendizaje, resolviendo heurísticas y modos de contar, y así sucesivamente.

Resumen de **Francisco José Cano Sevilla**

Recensiones matemáticas 14

2 de Julio de 2013 a las 12:26 h



Graphs, Networks and Algorithms, **Dieter Jungnickel**

La decimocuarta entrega de **Resúmenes de recensiones** nos la hace de nuevo **Francisco José Cano Sevilla**, profesor del Departamento de Estadística e Investigación Operativa de la UCM, sobre el libro *Graphs, networks and algorithms* (4ª ed.), de **Dieter Jungnickel**. Se trata de resúmenes de recensiones realizadas por docentes de esta Facultad para la **European Mathematical Society** y de los cuales tenemos algún ejemplar en nuestra Biblioteca.

Resumen

Esta edición ha sido completamente revisada y actualizada, los cambios han sido menos extensos que en anteriores ediciones. Desde luego, la aspiración general del texto permanece invariable. En particular, se ha añadido algún material: algo más sobre NP-completitud (especialmente sobre conjuntos dominantes), una sección sobre la teoría estructural de emparejamientos de Gallai-Edmonds, y alrededor de una docena de ejercicios adicionales, como siempre, con soluciones. Además, el teorema 1-factor ha sido completamente escrito de nuevo: contiene una breve demostración directa para la fórmula más general de Berge-Tutte. Se discuten algunos desarrollos habidos en la investigación actual y se han añadido unas pocas referencias.

Con material actualizado, ejercicios adicionales y nuevas referencias, esta nueva edición completamente revisada, mantiene los atributos ya considerados en otras ediciones, está escrito con claridad, comprensible, bien escrito, buena organización, recubrimiento comprensivo de la teoría esencial, auto contenido, altamente recomendado y aplicaciones bien elegidas, que le convierten en un excelente, exigente, fascinante y poderoso libro de texto, debido al sustancial desarrollo y enorme esfuerzo realizado.

Este libro estándar comienza con las muy básicas definiciones de la teoría de grafos, lo básico, construye y crea con celeridad una cantidad de teoremas, lemas, y finalmente, obtiene una colección completa de algoritmos sobre grafos y redes. Existen una gran cantidad de ejercicios y ejemplos, y una lista de referencias muy extensa.

Es un primer curso o primera clase sobre grafos, redes y algoritmos, y es indispensable para cualquiera que tenga que enseñar optimización combinatoria. Las soluciones están bien trabajadas para los ejercicios, o ayudas para algunos de ellos, son indispensables para los estudiantes, o lectores, que no permanezcan atentos. Esto es muy útil y conveniente para los cursos graduados en combinatoria, así como para el estudio independiente e investigación para los alumnos, profesores, profesionales e investigadores en esta área.

Resumen de **Francisco José Cano Sevilla**

Acto de Homenaje

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en memoria del profesor

Francisco José Cano Sevilla

Viernes 22 de Noviembre de 2013