$$\binom{n}{k} = \binom{n-1}{k} + \binom{n-1}{k-1};$$

such identities, including various forms of the Vandermonde convolution formula, are discussed in Chapter 1. One section is devoted to a family of identities that contains Abel's generalization of the binomial formula; multinomial analogues, including Hurwitz's extensions of Abel's formula, are also obtained by recurrence.

One of the simplest examples of an inverse relation is the pair

$$a_n = \sum_{k=0}^{n} (-1)^k \binom{n}{k} b_k \quad \text{and} \quad b_n = \sum_{k=0}^{n} (-1)^k \binom{n}{k} a_k,$$

each of which implies the other. Chapters 2 and 3 are concerned with such relations; relations of Gould, Chebyshev, and Legendre type are developed in Chapter 2 and relations associated with Abel identities and generating functions are treated in Chapter 3.

The author remarks that generating functions are "a constant feature of all parts of enumerative combinatorial analysis". Chapters 4 and 5 are focused on their use in establishing identities. There are sections in Chapter 4 on multisection of series (a process that generalizes the technique for splitting a series into its even and odd terms), on sums of products of the type

$$\binom{i+i_1}{i_1}\binom{i_1+i_2}{i_2} \cdots \binom{i_{n-1}+i_n}{i_n}\binom{i_n+i}{i},$$

and on applications of Lagrange series. The Bell polynomials are discussed in Chapter 5 and there is a section on number-theoretic aspects of partition polynomials.

Chapter 6 deals with the use of various difference and differential operators; the Stirling numbers appear here frequently.

Each chapter is followed by an extensive problem section and the text concludes with a bibliography of sixty-five entries.

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Introduction a la combinatorique en vue des applications, by A. Kaufmann. Dunod, Paris, 1968. xviii + 609 pages. 131.60 F.

The five chapters of this book fall into three classes. The first two chapters deal with combinatorial analysis in the traditional sense. The topics discussed are similar to those in Riordan [An introduction to Combinatorial Analysis, Wiley, New York, 1958] and the first three chapters of Ryser [Combinatorial Mathematics, Wiley, New York, 1963] (except that partitions and Pólya's Theorem are not considered). The treatment in this book is perhaps more expository and many

more illustrations are given.

The third and fourth chapters are devoted to certain aspects of graph theory. The main emphasis is on describing methods for generating subgraphs of a graph that enjoy various properties; many of these methods involve properties of matrix multiplication. Some of the material is similar to that presented in Chapter 4 of the author's earlier book, Graphs, Dynamic Programming, and Finite Games, [Academic Press, New York, 1967].

The fifth chapter is devoted to optimization problems. Dynamic programming, scheduling problems, the travelling salesman problem, flows in networks, and other topics pertaining to operations research are mentioned. The text concludes with two appendices; the first is on algebra and the second, written by Georges Cullman, is on codes.

At the end of the book the author has listed a number of criticisms that could be made of the book together with his replies. For example, he excuses the omission of various topics and the absence of physical, biological, or sociological applications on the grounds that it would require another book to include these things also. To the complaint that there are no exercises of a theoretical nature to supplement the text, he comments that one can find such exercises in Riordan's book. There is no shortage of exercises in the book, but they "sont généralement trop simples ou constituant une pure et directe application de ce qui est traité dans chaque paragraphe". His reply: "Cet ouvrage est destiné à des utilisateurs et non pas à des condidats à des diplômes de mathématiciens." There are some books listed at the back for collateral reading, but there are only a handful of references to journal articles. This lack of references, which might detract somewhat from the usefulness of the book, is not included in the author's list of criticisms, but the explanation probably lies in the fact that the book, as he states elsewhere, "n'est pas un traité mais une introduction élémentaire" intended primarily, or so it would appear from the preface, for "l'ingénieur et le chercheur opérationnel".

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Digitalrechner in technischen Prozessen, by Dr. -Ing. Helmut Hotes. Walter de Gruyter and Co., Berlin, 1967. 313 pages.

After a brief introduction to the field, the author describes very thoroughly in the second chapter the organization of a digital computer. In the following chapter a good introduction to programming is given. Since the reader is not assumed to be familiar with the programming of a digital computer, this chapter is rather extensive and contains fourteen examples which are solved in detail.

The next three chapters lead to questions whose answers are the basis of the final chapters of the book: they discuss topics such as programming of input and output, translation of programs and parallel programming.

The three remaining chapters (Chapters 7, 8, 9) deal with important practical questions: control of technical processes, control of unsteady processes, and regulation processes. The book ends with an extensive bibliography (66 titles) and a good index.

In the opinion of the reviewer, this book gives an excellent and thorough introduction to the application of digital computers in technical processes (though it is, as mentioned in the Foreword, designed above all for readers having a