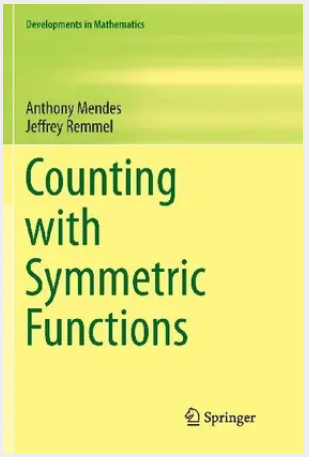
Mendes / Remmel

Counting with Symmetric Functions



This monograph provides a self-contained introduction to symmetric functions and their use in enumerative combinatorics. It is the first book to explore many of the methods and results that the authors present. Numerous exercises are included throughout, along with full solutions, to illustrate concepts and also highlight many interesting mathematical ideas.

The text begins by introducing fundamental combinatorial objects such as permutations and integer partitions, as well as generating functions. Symmetric functions are considered in the next chapter, with a unique emphasis on the combinatorics of the transition matrices between bases of symmetric functions. Chapter 3 uses this introductory material to describe how to find an assortment of generating functions for permutation statistics, and then these techniques are extended to find generating functions for a variety of objects in Chapter 4. The next two chapters present the Robinson-Schensted-Knuthalgorithm and a method for proving Pólya's enumeration theorem using symmetric functions. Chapters 7 and 8 are more specialized than the preceding ones, covering consecutive pattern matches in permutations, words, cycles, and alternating permutations and introducing the reciprocity method as a way to define ring homomorphisms with desirable properties.

Counting with Symmetric Functions will appeal to graduate students and researchers in mathematics or related subjects who are interested in counting methods, generating functions, or symmetric functions. The unique approach taken and results and exercises explored by the authors make it an important contribution to the mathematical literature.

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