

Preface

This is the second (and final) volume of a graduate-level introduction to enumerative combinatorics. To those who have been waiting twelve years since the publication of Volume 1, I can only say that no one is more pleased to see Volume 2 finally completed than myself. I have tried to cover what I feel are the fundamental topics in enumerative combinatorics, and the ones that are the most useful in applications outside of combinatorics. Though the book is primarily intended to be a textbook for graduate students and a resource for professional mathematicians, I hope that undergraduates and even bright high-school students will find something of interest. For instance, many of the 66 combinatorial interpretations of Catalan numbers provided by Exercise 6.19 should be accessible to undergraduates with a little knowledge of combinatorics.

Much of the material in this book has never appeared before in textbook form. This is especially true of the treatment of symmetric functions in Chapter 7. Although the theory of symmetric functions and its connections with combinatorics is in my opinion one of the most beautiful topics in all of mathematics, it is a difficult subject for beginners to learn. The superb book by Macdonald on symmetric functions is highly algebraic and eschews the fundamental combinatorial tool in this subject, viz., the Robinson–Schensted–Knuth algorithm. I hope that Chapter 7 adequately fills this gap in the mathematical literature. Chapter 7 should be regarded as only an introduction to the theory of symmetric functions, and not as a comprehensive treatment.

As in Volume 1, the exercises play a vital role in developing the subject. If in reading the text the reader is left with the feeling of “what’s it good for?” and is not satisfied with the applications presented there, then (s)he should turn to the exercises. Thanks to the wonders of electronic word processing, I found it much easier than for Volume 1 to assemble a wide variety of exercises and solutions.

I am grateful to the many persons who have contributed in a number of ways to the improvement of this book. Special thanks go to Sergey Fomin for his many suggestions related to Chapter 7, and especially for his masterful exposition of the difficult material of Appendix 1. Other persons who have carefully read portions of earlier versions of the book and who have offered valuable suggestions

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The paperback printing contains addenda to some of the exercises in a new section on page 583. The exercises in question are indicated by * in the main text.

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- p. 124, Exercise 5.28
 - p. 136, Exercise 5.41(j)
 - p. 144, Exercise 5.53
 - p. 151, Exercise 5.62(b)
 - p. 231, Exercise 6.25(i)
 - p. 232, Exercise 6.27(c)
 - p. 264, Exercise 6.19(iii)
 - p. 265, Exercise 6.19(mmm)
 - p. 272, Exercise 6.33(c)
 - p. 279, Exercise 6.56(c)
 - p. 467, Exercise 7.55(b)
 - p. 534, Exercise 7.74
 - p. 539, Exercise 7.85