

CONTENTS

ONE: INTRODUCTION	1
Counting	1
One-to-one Correspondence	2
Parity	4
Problems	7
TWO: BINOMIAL COEFFICIENTS	13
Permutations and Combinations	13
Identities	20
Applications	32
Sampling with Replacement	40
Problems	45
THREE: GENERATING FUNCTIONS	59
Introduction	59
Fibonacci Numbers	63
More Generating Functions	67
Partitions	71
More Recurrence Relationships	81
Problems	83
FOUR: ADVANCED COUNTING NUMBERS	103
Multinomial Coefficients	103
Stirling Numbers	107
Catalan Numbers	121
Problems	133
FIVE: TWO FUNDAMENTAL PRINCIPLES	144
The Dirichlet Pigeonhole Principle	144
Ramsey's Theorem	147
The Principle of Inclusion-Exclusion	154
Problems	167

SIX: PERMUTATIONS	179
Cycles	179
Parity	189
Conjugacy Classes	195
Orbits	198
Polya's Theorem (<i>Special Case</i>)	205
Polya's Theorem (<i>General Case</i>)	209
Problems	216
SEVEN: GRAPHS	228
Paths	228
Trees	235
Cayley's Formula	244
The Enumeration of Graphs	258
Euler's Formula	265
Problems	271
APPENDIX:	
MATHEMATICAL INDUCTION	283
INDEX	295