

Preface	vii
1 Setting the Stage	1
1.1 Popular Lacings	2
1.2 Dense, Straight, Superstraight, and Simple Lacings	4
1.3 Notes	6
2 One-Column Lacings	7
2.1 The Number of One-Column n -Lacings	8
2.2 The Shortest One-Column n -Lacings	9
2.3 The Longest One-Column n -Lacings	9
2.4 Straight n -Lacings and One-Column n -Lacings	14
2.5 Notes	16
3 Counting Lacings	19
3.1 The Number of n -Lacings	19
3.2 Notes	28
4 The Shortest Lacings	29
4.1 Statement of Results	29
4.2 The Shortest General and Dense n -Lacings	31
4.3 The Shortest Straight n -Lacings	37
4.4 The Shortest Dense-and-Straight n -Lacings	39
4.5 Comparing the Lengths of Some Popular n -Lacings	41
4.6 Notes	43
5 Variations on the Shortest Lacing Problem	47
5.1 Linear Shoes	47
5.2 Framed Shoes	50
5.3 General Shoes	52
5.4 Open Lacings	55
5.5 Multi-Loop Lacings	56

6	The Longest Lacings	59
6.1	Summary of Results and Conjectures	59
6.2	The Longest Simple n -Lacings	60
6.3	The Longest Dense and General n -Lacings	61
6.4	The Longest Straight and Superstraight n -Lacings	68
6.5	The n -Lacings of Longest Vertical Length	71
6.6	Notes	81
7	The Strongest Lacings	83
7.1	Statement of Results	85
7.2	The Strongest n -Lacings	86
7.3	The Strongest Straight n -Lacings	88
7.4	Proofs of the Lemmas	89
7.5	Notes	99
8	The Weakest Lacings	101
8.1	Summary of Results and Conjectures	101
8.2	Notes	106
A	Related Mathematics	107
A.1	Traveling Salesman Problems	107
A.2	The Shoelace Formula	109
B	Loose Ends	111
B.1	History	111
B.2	Shoelace Superstitions	112
B.3	Questions of Style	112
B.4	Fashion	114
B.5	What Is the Best Way to Lace Your Shoes?	115
B.6	Foot Problems and Lacings	116
B.7	What Is the Best Way to Tie Your Shoelaces?	118
	References	121
	Index	123