

Contents

Preface, xi

Acknowledgments, xiii

Introduction, xv

List of Notation, xix

I Convex Functions on the Real Line

- 10. Introduction, 2
- 11. Continuity and Differentiability, 3
- 12. Characterizations, 9
- 13. Closure under Functional Operations, 15
- 14. Differences of Convex Functions, 22
- 15. Conjugate Convex Functions, 28

II Normed Linear Spaces

- 20. Introduction, 38
- 21. Normed Linear Spaces, 38
- 22. Functions on Normed Linear Spaces, 54
- 23. Derivatives in a Normed Linear Space, 62

III Convex Sets

- 30. Introduction, 73
- 31. Convex Sets and Affine Sets, 73
- 32. Hyperplanes and Extreme Points, 81

IV Convex Functions on a Normed Linear Space

- 40. Introduction, 89
- 41. Continuity of Convex Functions, 91
- 42. Differentiable Convex Functions, 97
- 43. The Support of Convex Functions, 104
- 44. Differentiability of Convex Functions, 113

V Optimization

- 50. Introduction, 122
- 51. Maxima and Minima, 122
- 52. Minimax Theorems and the Theory of Games, 128
- 53. Linear Programming, 138
- 54. The Simplex Method, 154
- 55. Convex Programming, 170
- 56. Approximation, 179

VI Inequalities

- 60. Introduction, 189
- 61. The Classical Inequalities, 189
- 62. The Generalized Geometric Mean–Arithmetic Mean Inequality and Norms, 194
- 63. Matrix Inequalities, 200

VII Midconvex Functions

- 70. Introduction, 211
- 71. Midconvex Functions on a Normed Linear Space, 211
- 72. Midconvex Functions on \mathbf{R} , 218

VIII Related Classes of Functions

- 80. Introduction, 227
- 81. Quasiconvex Functions, 228
- 82. Completely Convex Functions, 233
- 83. Convex Functions of Higher Order, 237
- 84. Generalized Convex Functions, 240
- 85. More about Generalized Convex Functions, 246
- 86. Other Related Topics, 253

Appendix, 263

- Introduction, 264
- Independent Study Projects, 264
- Unsolved Problems, 271

Bibliography, 273

Author Index, 289

Subject Index, 295