

## CONTENTS

<u>Part I. Preliminaries . . . . .</u>	1
§1. Notation . . . . .	1
§2. The Hahn-Banach Theorem . . . . .	2
§3. The Separation Theorems . . . . .	4
§4. The Alaoglu-Bourbaki Theorem . . . . .	7
§5. The Krein-Milman Theorem . . . . .	8
<u>Part II. Theory of Optimization . . . . .</u>	14
§6. Convex Functions . . . . .	14
§7. Directional Derivatives . . . . .	16
§8. Subgradients . . . . .	20
§9. Normal Cones . . . . .	23
§10. Subdifferential Formulas . . . . .	25
§11. Convex Programs . . . . .	29
§12. Kuhn-Tucker Theory . . . . .	32
§13. Lagrange Multipliers . . . . .	36
§14. Conjugate Functions . . . . .	42
§15. Polarity . . . . .	48
§16. Dubovitskii-Milyutin Theory . . . . .	51
§17. An Application . . . . .	56
§18. Conjugate Functions and Subdifferentials . . . . .	58
§19. Distance Functions . . . . .	61
§20. The Fenchel Duality Theorem . . . . .	65
§21. Some Applications . . . . .	70
<u>Part III. Theory of Best Approximation . . . . .</u>	76
§22. Characterization of Best Approximations . . . . .	76
§23. Extremal Representations . . . . .	81
§24. Application to Gaussian Quadrature . . . . .	88
§25. Haar Subspaces . . . . .	91
§26. Chebyshev Polynomials . . . . .	98
§27. Rotundity . . . . .	105
§28. Chebyshev Subspaces . . . . .	109
§29. Algorithms for Best Approximation . . . . .	118
§30. Proximinal Sets . . . . .	123

<u>Part IV. Comments on the Problems</u>	128
Bibliography	138
<u>Part V. Selected Special Topics</u>	145
§31. E-spaces	145
§32. Metric Projections	157
§33. Optimal Estimation	177
§34. Quasi-Solutions	203
§35. Generalized Inverses	214