<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preface to the first edition</td>
<td>xvii</td>
</tr>
<tr>
<td>Preface to the second edition</td>
<td>xviii</td>
</tr>
<tr>
<td>Analysis over supernumbers</td>
<td>1</td>
</tr>
<tr>
<td>Supernumbers and superanalytic functions</td>
<td>1</td>
</tr>
<tr>
<td>Grassmann algebras</td>
<td>1</td>
</tr>
<tr>
<td>Supernumbers</td>
<td>1</td>
</tr>
<tr>
<td>c-numbers and a-numbers</td>
<td>2</td>
</tr>
<tr>
<td>Superanalytic functions of supernumbers</td>
<td>3</td>
</tr>
<tr>
<td>Integration of superanalytic functions of supernumbers</td>
<td>5</td>
</tr>
<tr>
<td>Real supernumbers. Differentiable functions of real c-numbers and their integrals</td>
<td>5</td>
</tr>
<tr>
<td>Complex conjugation</td>
<td>5</td>
</tr>
<tr>
<td>Functions, distributions and integrals over $\mathbb{R}[c]$</td>
<td>6</td>
</tr>
<tr>
<td>Fourier transforms over $\mathbb{R}[c]$</td>
<td>8</td>
</tr>
<tr>
<td>Functions and integrals over $\mathbb{R}[a]$</td>
<td>8</td>
</tr>
<tr>
<td>Basic definitions</td>
<td>8</td>
</tr>
<tr>
<td>Fourier transforms over $\mathbb{R}[a]$</td>
<td>10</td>
</tr>
<tr>
<td>Integrals over $\mathbb{R}^{n}[a]$</td>
<td>12</td>
</tr>
<tr>
<td>Supervector spaces</td>
<td>14</td>
</tr>
<tr>
<td>Definition</td>
<td>14</td>
</tr>
<tr>
<td>Bases</td>
<td>16</td>
</tr>
<tr>
<td>Pure bases</td>
<td>17</td>
</tr>
<tr>
<td>Pure real bases</td>
<td>20</td>
</tr>
<tr>
<td>Standard bases</td>
<td>24</td>
</tr>
<tr>
<td>Linear transformations, supertranspositions and dual supervector spaces</td>
<td>24</td>
</tr>
<tr>
<td>Change of basis</td>
<td>24</td>
</tr>
<tr>
<td>Shifting indices. The supertranspose</td>
<td>25</td>
</tr>
<tr>
<td>Extensions of the supertransposition rules</td>
<td>27</td>
</tr>
<tr>
<td>Dual supervector spaces</td>
<td>28</td>
</tr>
<tr>
<td>Dual bases</td>
<td>30</td>
</tr>
<tr>
<td>Further index-shifting conventions</td>
<td>31</td>
</tr>
<tr>
<td>The supertrace and the superdeterminant</td>
<td>33</td>
</tr>
<tr>
<td>The supertrace</td>
<td>33</td>
</tr>
<tr>
<td>The superdeterminant</td>
<td>34</td>
</tr>
<tr>
<td>The superdeterminant in special cases</td>
<td>35</td>
</tr>
<tr>
<td>The superdeterminant in the general case</td>
<td>36</td>
</tr>
<tr>
<td>Integration over $\mathbb{R}[m][c] [\times] \mathbb{R}[n][a]$</td>
<td>37</td>
</tr>
<tr>
<td>Notation</td>
<td>37</td>
</tr>
<tr>
<td>Integration</td>
<td>38</td>
</tr>
<tr>
<td>Homogeneous linear transformations of the a-number coordinates</td>
<td>39</td>
</tr>
<tr>
<td>Homogeneous linear transformations of all the coordinates</td>
<td>40</td>
</tr>
</tbody>
</table>
Super Lie groups. General theory p. 123
Definition and structure of super Lie groups p. 123
Definition p. 123
Canonical diffeomorphisms p. 124
Left- and right-invariant vector fields p. 125
Left- and right-invariant local frame fields p. 125
Left- and right-invariant congruences p. 126
One-parameter Abelian subgroups p. 127
The exponential mapping. Canonical coordinates p. 129
The super Lie algebra p. 130
The structure constants p. 131
The right and left auxiliary functions p. 132
Identities satisfied by the auxiliary functions p. 134
Construction of a super Lie group from its super Lie algebra p. 135
Realizations of super Lie groups p. 137
Definition p. 137
Orbits p. 137
Transitive realizations p. 138
Isotropy subgroups p. 139
Coset spaces p. 140
Killing flows p. 141
Properties of the coordinate components of the $Q_a$ p. 143
A special canonical coordinate system p. 144
Coordinates for the coset spaces p. 146
Classification of transitive realizations p. 147
Matrix representations of super Lie groups p. 149
Contragredient representations p. 149
Inner automorphisms. The adjoint representation p. 150
Matrix representations of the super Lie algebra p. 151
Geometry of coset spaces p. 152
Invariant tensor fields p. 152
Differential equations for geometrical structures p. 154
Integrability of the differential equations p. 154
A special coordinate system p. 156
Condition for the existence of a group-invariant measure function p. 158
Condition for the existence of a group-invariant metric tensor field p. 158
Condition for the existence of a group-invariant connection p. 159
Solutions of the differential equations p. 161
Geometry of the group supermanifold p. 163
Identity of the left- and right-invariant connections p. 165
Parallelism at a distance in the group supermanifold p. 165
Integration over the group p. 166
A special class of super Lie groups p. 168
Exercises p. 170
Comments on chapter 3 p. 171
Super Lie groups. Examples p. 173
Construction of super Lie algebras and super Lie groups p. 173
Properties of the structure constants p. 173
Conventional super Lie groups, $Z[\text{subscript} 2]$-graded algebras p. 173
Unconventional super Lie groups p. 174
Structure of conventional super Lie Groups. The extending representation p. 176
Construction of a class of super Lie algebras p. 176
Notation p. 179
The classical super Lie groups p. 180
The group GL (m, n) p. 180
The group SL (m, n) p. 183
The group SL (m, m)/GL (1, 0) p. 185
The orthosymplectic group OSp (m, n) p. 187
The Kac notation p. 190
The group P(m) p. 191
The group Q(m) p. 193
The group Q(m) p. 193
The exceptional simple super Lie groups p. 194
The groups D(2, 1, [alpha]) p. 194
The group F(4) p. 197
The structure of F(4) p. 199
Pseudorepresentation of F(4) p. 200
The group G(3) p. 201
The structure of G[\text{subscript} 2] p. 203
The structure of G(3) p. 204
Pseudorepresentation of G(3) p. 206
Super Lie groups of basic importance in physics p. 207
The super de Sitter group p. 207
The super Poincare group p. 209
The coset space: super Poincare group/SO(1, 3) p. 210
Killing flows and invariant connections p. 211
Riemannian geometry of the coset space p. 212
The super Lorentz group p. 213
The Cartan super Lie groups p. 216
The diffeomorphism group Diff(M) p. 216
The group SDiff(M, [mu]) p. 216
The canonical transformation group Can(M, [omega]) p. 217
Eigenvectors of $x_1$ and $x_2$. Choice of pure basis

Coherent states

The functional integral representation of $[a^{**}, t^*]

Direct evaluation of the functional integral

The importance of endpoint contributions

The stationary trajectory as a matrix element

The Feynman propagator

The Bose oscillator

Action functional and Green's functions

Mode functions and Hamiltonian

Energy eigenvectors

Coherent states

Hamilton-Jacobi theory

The amplitude $[x', t' x', t']$ and its functional integral representation

The functional-integral representation of $[a^{**}, t^*]

The stationary path between coherent states

The Feynman propagator

Energy eigenfunctions

Bose-Fermi supersymmetry

The simplest model

New conserved quantities

The Bose-Fermi supersymmetry group

Eigenvalues of $Q_1$ and $Q_2$

The supersymmetry group as a transformation group

Auxiliary variable

Nonlinear Bose-Fermi supersymmetry

The supersymmetry group

A pure basis

The energy spectrum

Spontaneously broken supersymmetry

Exercises

Comments on chapter 5

Applications involving topology

Nontrivial configuration spaces

Standard canonical systems

Green's functions

Equivalence of Peierls and Poisson brackets

Quantization

Problems with the naive quantization rule

Operator-valued forms. The projection m-form

The position operator